

# Reducing Obesity Prejudice in Medical Education

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## ABSTRACT

**Background:** Healthcare worker attitudes toward obese individuals facilitate discrimination and contribute to poor health outcomes. Previous studies have demonstrated medical student bias toward obese individuals, but few have examined effects of the educational environment on these prejudicial beliefs. We sought to determine whether an innovative educational intervention (reading a play about obesity) could diminish obesity prejudice relative to a standard medical lecture. **Methods:** We conducted a randomized, controlled trial enrolling medical students ( $n = 129$ ) from three universities. Students were assigned to play-reading or a standard lecture. Explicit attitudes and implicit bias toward obese individuals were assessed prior to intervention and after four months. **Results:** At baseline, students demonstrated moderate explicit and implicit bias toward obese people despite high scores on empathy. Students randomized to the play-reading group had significantly decreased explicit fat bias ( $P = 0.01$ ) at follow-up, while students in the lecture group showed increased endorsement of a prescriptive model of care at the expense of a patient-centered approach ( $P = 0.03$ ). There was a significant increase in empathy for those in both the theater ( $P = 0.007$ ) and lecture group ( $P = 0.02$ ). The intervention had no significant effect on implicit bias or regard for obesity as a civil rights issue. **Discussion:** Dramatic reading may be superior to traditional medical lectures for showcasing patient rights and preferences. The present study demonstrates for the first time that play-reading diminishes conscious obesity bias. Further research should determine whether nontraditional methods of instruction promote improved understanding of and care for obese patients.

**Keywords:** Behavioral Science, health education, prejudice, psychosocial variables, weight-related discrimination

## Background

Medical education recognizes the need for physicians to understand and interact with patients of different social and cultural backgrounds.<sup>[1]</sup> However, healthcare providers harbor bias despite training that discriminatory notions are detrimental to care.<sup>[2]</sup> Patients can also be prejudicially blamed by others, including doctors and medical students, as willfully responsible for their illnesses due to “misbehavior” or lifestyle choices and faulted in the name of advocacy for improved health.<sup>[3]</sup> Obesity prejudice is well accepted in popular culture

and pervasive within medicine,<sup>[4]</sup> affecting even healthcare providers specializing in care for those who are overweight.<sup>[5]</sup> Additionally, obese individuals encounter discrimination in numerous life activities, from obtaining a job to receiving a routine physical examination, which abrogates self-worth and health.<sup>[6]</sup> Lectures on obesity management rarely include information encouraging empathy or sensitivity toward obese individuals because the most emphasized aspects include “controllable factors” such as exercise and diet.<sup>[7]</sup> Concerns therefore exist regarding the influence of medical education on the promotion of sensitive care during training.<sup>[8]</sup>

Despite recognition that the field of medical humanities enriches biomedical instruction through the incorporation of literature, philosophy and sociology (among other disciplines), there are insufficient data supporting its ability to do so.<sup>[9]</sup> Theater for the purpose of instructing medical students has been used previously, with suggestions that the activity incites and augments empathic patient-centered care.<sup>[10,11]</sup> The active engagement that theater, as opposed to film

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or reading, requires is perceived to promote involvement with the “other,” including marginalized and underserved populations.<sup>[12]</sup> Theater training has also been linked to responsiveness, commitment and sensitivity; qualities that in the United States have been incorporated into Accreditation Council for Graduate Medical Education (ACGME) standards.<sup>[13]</sup>

From the perspective of theater of (and for) the oppressed, it has been argued that interactive theater in medical education develops critical thinking and challenges learners with unfamiliar and uncomfortable situations, ideas and perspectives, thus bringing issues of social justice, including a reduction of prejudice, to the fore.<sup>[14]</sup> Theater complements cultural competency modules that focus on the acknowledgement and awareness of social biases.<sup>[15]</sup> Moreover, dramatic reading can be seen as another form of “perspective-taking” in which one tries to understand different perspectives and situations.<sup>[16]</sup>

The objectives of this study were to determine medical students’ implicit and explicit bias toward obese people, degree of empathy, viewpoint on obesity as a civil rights issue and management of an obese elderly woman who is otherwise healthy before and after random assignment to either a standard lecture on the medical management of the obese patient or a student group dramatic reading of “The Most Massive Woman Wins”, a play that portrays the experience of obese women in a liposuction clinic.<sup>[17]</sup> Plays with overweight characters present the lived experience of obesity as discourse on consequences of discrimination and depending upon the relatability of the characters may promote strong compassionate reactions.<sup>[18]</sup>

We hypothesized that intervention with an arts-based module would decrease obesity prejudice, while such prejudice would either increase or remain unchanged with a standard lecture. Additionally, we hypothesized that students would alter their perception of obesity and clinical management based upon a dramatic reading of characters that faced discrimination based on their weight.

## Methods

### Setting

The study took place at three medical schools over a period of four months: University of California, Davis, School of Medicine; University of California, Irvine, School of Medicine; and Mayo Medical School, Rochester, Minnesota. These medical schools were chosen based on interest and availability for study participation. The total number of potential participants was 994.

The interventions described in the following sections were standardized across the sites to reduce variability.

### Standard lecture intervention

Students in the standard group attended a one-hour lecture on the medical management of obesity. The lecture format is still the most widely used teaching method in medical education.<sup>[19,20]</sup> The lecture contained information distilled from [www.obesity.org](http://www.obesity.org), the official website for the Obesity Society, a leading scientific organization for the study of obesity that engages in teaching, research, and advocacy.<sup>[21]</sup> The lecture, conducted by faculty (UC Irvine) and students (UC Davis and Mayo Medical School) included a PowerPoint presentation supplemented with extensive notes, including statements that obese persons often experienced bias from society and health professionals, and that such bias is counterproductive to effective treatment. The lecture also noted the importance of actively involving the patient in treatment by soliciting the patient’s motivation for and past efforts at weight loss. After the lecture, students were given the opportunity to ask questions about concepts that were unclear or needed further clarification.

### Medical humanities intervention

Students randomly assigned to the experimental group participated in a one-hour dramatic reading of “The Most Massive Woman Wins”. The script was ten pages long and incorporated the narratives of women from different walks of life and how they came to understand their weight in the context of social discrimination. This included being made fun of as a child by family and friends, abusive relationships and inability to find jobs despite adequate qualifications and training.<sup>[17]</sup> When appropriate, parts were double-cast to allow as many students as possible to read. Students who did not read served as the audience. After the reading, all students present discussed the play among themselves, with minimal nondirective facilitation by the study coordinators. Discussion often centered upon the hardships encountered by the main characters. Frequently, students recalled personal experiences of loved ones who were overweight that mirrored what happened to characters in the play. Those who read a part often reflected on their character, either understanding or confronting their perspective, which may have conflicted with the student’s expectations.

### Surveys

Outcome measures were obtained of established methods for measuring implicit bias, explicit bias and physician empathy using a centralized web-based system. Participants were provided with a link to a website created by Project Implicit<sup>®</sup>, which included the implicit association test (IAT) in addition to the antifat attitudes questionnaire and free response questions on obesity management and the concern for obesity as a civil rights issue. For implicit bias, the obesity-specific IAT was used, with positive d scores (range of -2.0 to 2.0) reflecting a stronger association of “bad” or “lazy” characteristics associated with

fat people compared with thin people, with 0.30 used as a common marker in the literature for “moderate” bias. The IAT has been used in hundreds of published research studies, with appropriate construct and predictive validity, including studies of obesity.<sup>[22]</sup>

The antifat attitudes questionnaire, conceptualized in 1994 and used in numerous studies on obesity prejudice, was used to measure explicit bias toward obese persons, with score ranging from 11 to 99, where higher values demonstrate a stronger antifat bias.<sup>[23]</sup> The Jefferson Scale of Physician Empathy (JSPE), with score ranges of 20–180, was included for assessment of empathy and has been utilized in medical student and resident studies on professionalism and humility.<sup>[24]</sup> Cronbach alpha values for the antifat attitudes questionnaire and empathy scale in our study were 0.90 and 0.76, respectively.

The two open-ended questions were formulated for the purpose of assessing in greater depth the frameworks within which medical students understood obesity. One question asked students to discuss whether they viewed obesity as a civil rights issue or a medical/public health issue. This question was intended to help determine whether students recognized obesity as a trigger for discrimination and bias that needed to be addressed by society at large or whether they understood it primarily as a health problem best addressed between patient and physician. The second question asked students to formulate a treatment plan for an overweight but otherwise healthy older woman. The nature of students’ responses facilitated categorical coding, which was blinded. For question 1, we identified four categories: Civil rights/discrimination issue; public health/medical issue; both; and no response. For question 2, we coded student responses as primarily prescriptive (doctor-centered with reliance on standard recommendations); primarily patient-centered (with inquiry into patient preferences and reliance on tailored treatment); and no response. Three evaluators who were unaware of the treatment group independently scored the open-ended answers with any disagreements resolved by discussion. Coder agreement prior to final resolution was 83% for Q1 and 85% for Q2.

### Study implementation

We conducted a pre- and postactivity survey from July to October 2012 of currently enrolled medical students at the three medical schools, with postintervention follow-up of four months. The schools’ respective Institutional Review Boards approved the study. Recruitment messages were sent out to an e-mail listserv used by current medical students. The message discussed the survey’s intent to better characterize medical student attitudes toward overweight people and an opportunity to participate in either a medical lecture or dramatic reading for the assessment and development of future

educational modules. Enrolled students were randomized with online software ([www.randomizer.org/](http://www.randomizer.org/)). The online consent included a full description of the study, including potential harm (no more than minimal but with potential for discomfort) and all surveys were administered online through a contract with Project Implicit<sup>®</sup>. Participants received a monetary incentive (\$25) for participation in the study.

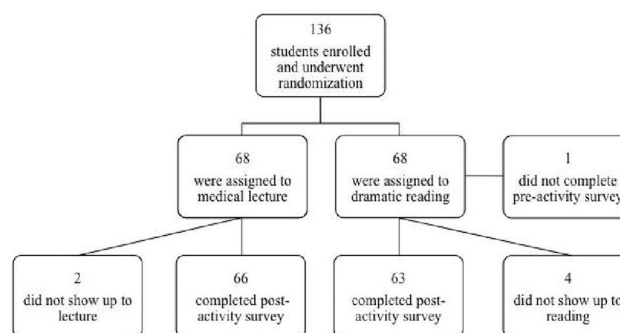
### Statistical analysis

Differences in baseline demographic characteristics, and preintervention explicit and implicit fat bias, empathy and categorized responses to questions on obesity as a civil rights issue and management of an otherwise healthy obese elderly patient were compared between the experimental and control groups, within each school separately, with the use of the two-sample Student’s *t*-test (for age, explicit fat bias, implicit fat bias and empathy) and Fisher’s exact test (for medical school, year in school, gender, free responses to open-ended questions). Differences in the pre–post change in scores, for each of the three endpoints, were tested using a mixed effects model, with school as the randomized blocking variable to control for intraclass correlation (within school), and including subject characteristics (age, sex, year in school). This model generates estimates of the net change (from baseline to follow-up) in the intervention relative to the control group, adjusting for covariates and accounting for clustering of students into medical schools. All statistical analyses were performed using SAS<sup>®</sup> software, version 9.3.

## Results

### Participants

The study had an overall response rate of 23% among first- and second-year students (only 16 third- and fourth-year medical students participated in the study). Response rate by school were as follows: UC Davis, 26% (49/192), UC Irvine, 19% (39/208) and Mayo Medical School, 27% (25/192). Upon communication with school administrators, it was clear that third- and fourth-year students were less likely to participate in research studies due to curricular demands. Figure 1 shows the number of subjects who participated in



**Figure 1:** Design of study

the study intervention and follow-up. Baseline characteristics were similar in the two study groups [Table 1], including all demographic variables and endpoints tested. However, the percentage of women in the study was higher than in the overall student population (personal communication, Office of Diversity and Outreach).

### Baseline assessment of bias and empathy

Overall, students' values on the explicit bias, implicit bias and empathy scales were  $43 \pm 16$ ,  $0.47 \pm 0.38$  and  $151 \pm 12$ , respectively. There was a significant correlation of explicit bias with implicit bias ( $\rho=0.32$ ;  $P < 0.001$ ) and with empathy ( $\rho = -0.28$ ;  $P < 0.01$ ), but there was no significant correlation of implicit bias with empathy ( $P$  values not adjusted for clustering).

### Intervention effects

Those who participated in the dramatic reading had decreased explicit bias compared with the lecture group (change in experimental group minus change in control group, -5.5 points;  $P = 0.01$ ). The paired  $t$ -test corroborated a highly significant difference in pre- and postintervention values of explicit fat bias in the theater group ( $P = 0.002$ ) but not for those in the lecture group ( $P = 0.61$ ). There was a significant increase in empathy for those in both the theater ( $P = 0.007$ ) and lecture group ( $P = 0.02$ ); theater, however, did not significantly increase empathy more than the control [Table 2]. Students in the lecture group were more likely to endorse a prescriptive model of patient care ( $P = 0.03$ ). There was no statistical difference with intervention for implicit bias, empathy, or consideration of obesity as a civil rights issue [Table 3].

### Exploratory subgroup analysis

In tests of covariates for interaction with group assignment, we found significant effect modification according to gender for changes in empathy. Among women (but not men), there were significant intervention effects on the change in empathy at the end of study (mean: +5.1 points, SEM: 2.3,  $P = 0.04$ ). Other covariates were not significant effect modifiers.

## Discussion

Multifaceted approaches promoting medical student competence in the care of underserved groups comprise a common strategy in school curricula.<sup>[25]</sup> However, we have little information regarding the efficacy of humanities-based modules. The majority of medical school coursework is lecture-based, with some schools incorporating problem-based learning.<sup>[26,27]</sup> This preliminary study compared lecture and dramatic reading to determine whether the participation in a dramatic reading that portrayed the challenges of living with obesity could decrease bias against obese people more significantly than a traditional lecture modality.

Despite didactic presentations routinely extolling the virtues of empathy and acceptance for patients from all backgrounds, health professionals and students-in-training remain highly biased against obese people.<sup>[28]</sup> In the present study, we found similar elevated explicit and implicit bias against obese individuals among our medical students that is on par with the general population.<sup>[29]</sup> Empathy scores were also similar to those reported in the literature using the JSPE.<sup>[30]</sup>

Encouragingly, students randomly assigned to read a play portraying obese characters had decreased explicit fat bias (5.5 point decrease on the 88-point scale, representing an effect size of more than one-third of a standard deviation) compared with students in the standard lecture group. These were especially noteworthy results when compared with another study of high school students who watched a film about discrimination in the lives of obese people and actually became *more* biased after this intervention.<sup>[31]</sup> The difference in

**Table 1: Study participant characteristics at baseline**

Characteristic (% where appropriate)	Lecture (N=66)	Theater (N=63)
Age (year)	25.2±2.9	25.1±2.9
Medical school (N)		
UC Davis (50%)	34	30
UC Irvine (30%)	20	19
Mayo Clinic (20%)	12	14
Year in school (N)		
1 (45%)	30	28
2 (43%)	30	25
3 (2%)	0	3
4 (10%)	6	7
Gender (N)		
Male (30%)	17	21
Female (70%)	49	42
Explicit fat bias	43.7±17.0	42.6±14.4
Implicit fat bias	0.52±0.42	0.44±0.35
Empathy	150.9±11.7	150.8±12.7
Is obesity a civil rights or health issue?		
Yes	11	6
No	26	21
Both	18	21
No response	11	15
Management of an asymptomatic, otherwise healthy elderly obese patient		
Prescriptive	41	37
Patient-centered	19	18
No response	6	8

<sup>1</sup>Plus-minus ( $\pm$ ) values are means±SD. There were no significant between-group differences at baseline.  $P$  values were based on Fisher's and  $t$ -tests. <sup>2</sup>Group scores for the antifat attitudes questionnaire, with a minimum score of 11 and maximum of 99. Higher scores are indicative of more negative attitudes toward fat people. <sup>3</sup>Group scores for the Implicit Association Test. Scores fall between -2 and 2, with positive values representing an automatic preference for thin compared to fat; 11 individuals did not complete the IAT task. <sup>4</sup>Group scores for the Jefferson Scale of Physician Empathy, with a minimum score of 20 and maximum of 180. Higher scores are indicative of increased empathy. <sup>5</sup>Numbers based on categorical coding of the open-ended question asking whether obesity was a civil rights or health issue. <sup>6</sup>Numbers based on categorical coding of the open-ended question regarding the management of an asymptomatic, otherwise healthy obese 66-year-old female in clinic

**Table 2: Study outcomes of explicit bias, implicit bias and empathy<sup>1</sup>**

Characteristic	Lecture			Theater			Difference in change from baseline (SEM) <sup>2</sup>
	Pre-intervention	Post-intervention	Change <sup>3</sup>	Pre-intervention	Post-intervention	Change <sup>3</sup>	
Explicit fat bias (range 11-99)	43.7±17.0	44.4±17.5	0.76±12.0	42.6±14.4	38.1±14.5	-4.5±11.2	-5.5* (2.10)
Implicit fat bias (range -2.0 to 2.0)	0.52±0.42	0.52±0.40	0±0.48	0.44±0.35	0.38±0.37	-0.03±0.44	-0.04 (-0.09)
Empathy (range 20-180)	150.9±11.7	153.7±13.7	2.7±9.3*	150.8±12.7	155.5±19.4	4.7±13.4*	+2.2 (2.0)

<sup>1</sup>values are means (±SD) or means with 95% confidence intervals. <sup>2</sup>multivariate analyses adjusted for sex, year in school, age, school and responses on the two open-ended questions. <sup>3</sup>pre- and postmeasures were compared using the student's *t*-test. \**P* value 0.05

**Table 3: Study outcomes for free response questions<sup>1</sup>**

	Change		Change		Pre-post difference		
Is obesity a civil rights or health issue?							
Yes	11	9	-2	6	10	+4	+6
No	26	25	-1	21	16	-5	-6
Both	18	18	0	21	21	0	0
No response	11	14	+3	15	16	+1	-2
Management of an asymptomatic, otherwise healthy elderly obese patient*							
Prescriptive	41	47	+6	37	31	-6	-12
Patient-centered	19	10	-9	18	21	+3	+12
No response	6	9	+3	8	11	+3	0

<sup>1</sup>pre- and postmeasures were compared using the Fishers exact test. \**P* value 0.05

our results from the movie-watching study results may relate to the level of engagement. Play-reading is an activity that requires participation; students espouse the role of an obese person by reading the play aloud.<sup>[32]</sup> Moreover, the difference could be attributed to the difference in age and interest between the study populations; our study population was older and more mature and had chosen to become physicians. Social desirability bias also could explain decreased reporting of conscious bias, if students felt they were supposed to be less prejudiced. We believe it is more likely that the dramatic reading promoted a deeper understanding of the extenuating circumstances surrounding the characters and how weight discrimination affects more aspects of life than physical health. Therefore, self-awareness of this injustice could have been incited among those in the theater group to decrease conscious bias. While there was no change in implicit bias, this lack of effect could reflect rigid models through which students formulate unconscious bias.<sup>[33]</sup>

Empathy was significantly increased in both the lecture and the play-reading groups, although this difference was not significantly greater with the theater intervention. Given the already high empathy scores in both groups,<sup>[30]</sup> it is noteworthy that both intervention conditions succeeded in raising students' scores still further. The fact that the theater intervention did not improve empathy scores more than the lecture condition may be explained by the fact that both conditions stressed understanding the perspective

of the overweight individual. Self-report evidence exists documenting improvements in medical student empathy as a result of participating in a readers' theater session related to aging<sup>[34]</sup> and other preliminary work suggests that greater empathy may in fact occur in a clinical setting in response to theater exposure.<sup>[35]</sup>

In terms of bias, empathic imagination may be regarded as the attitudinal mechanism by which bias is reduced because it stimulates a better understanding of the perspective of others.<sup>[36]</sup> It was surprising then that in this study, while empathy was correlated modestly with explicit bias, it was unrelated to implicit bias. This may suggest that empathy influences conscious attitudes toward others, but that implicit bias is harder to root out.

Students who participated in the medical lecture on managing an obese patient demonstrated a significant difference in their postsurvey free responses (obtained four months after study completion). Compared with those in the theatre group, these students endorsed a more prescriptive approach to care as opposed to a more patient-centered approach. Our study demonstrated that students who attended lecture more readily recommended weight loss and exercise without understanding the patient's perspective and preferences, despite the fact that the lecture mentioned (although did not emphasize) the value of knowing the patient's motivation and actively involving the patient in treatment. These results are consistent with a previous study of health professional students, who were influenced in their care of an obese patient depending on their educational curriculum,<sup>[37]</sup> and suggest that the prescriptive nature of lecture itself may encourage students to adopt physician-centered educational approaches with patients. Neither group demonstrated a change in how they conceptualized obesity as either primarily a civil rights or health issue. The lack of any shift in willingness to consider obesity as a civil rights issue could be the result of the contentious nature of fat-acceptance.<sup>[38]</sup>

The strengths of our study include a focus on obesity prejudice, inclusion of subjects from three different medical schools, and the assessment of numerous aspects of medical student attitudes toward obese people, using both student self-report and rater coding of narrative responses. The limitations include

the preliminary nature of the work, relatively short time span (months) in which attitudes could change, measurements of “feeling” rather than behavioral changes, and high baseline levels of empathy that could have been further teased out with a different measure of empathy demonstrating more variance in this population. The higher proportion of women in the study may be a possible explanation for baseline empathy levels, as other studies have documented greater levels of empathy in women than in men.<sup>[24]</sup> Further, we did not address whether the active variable influencing our results was the theater aspect of the intervention *per se*, or whether any active learning approach (i.e. small group discussion) would have achieved similar results compared with the more passive learning style of lecture. Finally, it is unclear whether diminished conscious bias is clinically significant in the sense that it would eventually lead to improved care for obese patients. One useful addition in future studies on the relevance of humanities-based interventions for clinical management of patients would be incorporation of the Objective Structured Clinical Examination (OSCE) in the control and experimental groups.

In conclusion, students who participated in a dramatic reading on the lived experience of obese characters showed decreased explicit fat bias, while overall differences in implicit bias and empathy were unaffected. The significant decrease of explicit fat bias using the performing arts intervention, consistent with other studies incorporating role-playing to attenuate bias,<sup>[39]</sup> provides tentative support for incorporating arts-based modules as required curricular components rather than ancillary adjuncts to traditional lectures.<sup>[40]</sup> Many countries, including those in developing nations, are at varying stages of exploring the incorporation of medical humanities into medical school curricula.<sup>[41]</sup> This research lends support to these efforts, as medical education administrations increasingly are seeking evidence of the value of such innovation. Future work should determine whether alternative methods of instruction, including the arts, merit mandatory incorporation into either undergraduate or medical curricula to promote well-being and improved care for marginalized groups.

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## References

- Betancourt JR, Green AR, Carrillo JE, Park ER. Cultural competence and health care disparities: Key perspectives and trends. *Health Aff (Millwood)* 2005;24:499-505.
- Kaminsky J, Gadaleta D. A study of discrimination within the medical community as viewed by obese patients. *Obes Surg* 2002;12:14-8.
- Fitzgerald FT. The tyranny of health. *New Engl J Med* 1994;331:196-8.
- Acuna LE. Don't cry for us Argentinians: Two decades of teaching medical humanities. *Med Humanit* 2000;26:66-70.
- Schwartz MB, Chambliss HO, Brownell KD, Blair SN, Billington C. Weight bias among health professionals specializing in obesity. *Obes Res* 2003;11:1033-9.
- Carr D, Friedman MA. Is obesity stigmatizing? Body weight, perceived discrimination, and psychological well-being in the United States. *J Health Soc Behav* 2005;46:244-59.
- Puhl R, Brownell KD. Bias, discrimination, and obesity. *Obes Res* 2001;9:788-805.
- Hafferty FW, Franks R. The hidden curriculum, ethics teaching, and the structure of medical education. *Acad Med* 1994;69:861-71.
- Perry M, Maffulli N, Willson S, Morrissey D. The effectiveness of arts-based interventions in medical education: A literature review. *Med Educ* 2011;45:141-8.
- Shapiro J, Hunt L. All the world's a stage: The use of theatrical performance in medical education. *Med Educ* 2003;37:922-7.
- Reilly JM, Trial J, Piver DE, Schaff PB. Using Theater to Increase Empathy Training in Medical Students. *J Learn Arts* 2012;8:1.
- Ross S, Heys S, Galley H. Using live theatre in teaching about domestic abuse. *Med Educ* 2010;44:503-4.
- Watson K. Perspective: Serious play: Teaching medical skills with improvisational theater techniques. *Acad Med* 2011;86:1260-5.
- Boal A. *Theatre of the Oppressed*. In: New York: Theatre Communications Group; 1979.
- Kleinman A, Benson P. Anthropology in the clinic: The problem of cultural competency and how to fix it. *PLoS Med* 2006;3:e294.
- Bodenhorn N, Starkey D. Beyond role-playing: Increasing counselor empathy through theater exercises. *J Creat Ment Health* 2005;1:17-27.
- George M. *The Most Massive Woman Wins*. In: Young G, editor. New York, NY: Applause Theatre; 1998.
- Jester J. *Placing Fat Women on Center Stage*. New York, NY: New York University Press; 2009.
- Melin I, Karlström B, Berglund L, Zamfir M, Rössner S. Education and supervision of health care professionals to initiate, implement and improve management of obesity. *Patient Educ Couns* 2005;58:127-36.
- Krebs NF, Primak LE. Comprehensive integration of nutrition into medical training. *Am J Clin Nutr* 2006;83:945-50S.
- Health NIO. *The practical guide: Identification, evaluation, and treatment of overweight and obesity in adults*. NIH Publication No 00-4084. 2000.
- Greenwald AG, Nosek BA, Banaji MR. Understanding and using the implicit association test: I. An improved scoring algorithm. *J Pers Soc Psychol* 2003;85:197-216.
- Crandall CS. Prejudice against fat people: Ideology and self-interest. *J Pers Soc Psychol* 1994;66:882-94.
- Hojat M, Gonnella JS, Nasca TJ, Mangione S, Veloksi JJ, Magee M. The Jefferson Scale of Physician Empathy: Further psychometric data and differences by gender and specialty at item level. *Acad Med* 2002;77:S58-60.
- Wald HS, Borkan JM, Taylor JS, Anthony D, Reis SP. Fostering and evaluating reflective capacity in medical education: Developing the REFLECT rubric for assessing reflective writing. *Acad Med* 2012;87:41-50.
- Newble DI, Entwistle NJ. Learning styles and approaches: Implications for medical education. *Med Educ* 1986;20:162-75.
- Barrows HS. A taxonomy of problem-based learning methods. *Med Educ* 1986;20:481-6.
- Wolf C. Physician assistants' attitudes about obesity and obese individuals. *J Allied Health* 2012;41:e45-8.

29. Schwartz MB, Vartanian LR, Nosek BA, Brownell KD. The influence of one's own body weight on implicit and explicit anti-fat bias. *Obesity* (Silver Spring) 2006;14:440-7.
30. Chen D, Lew R, Hershman W, Orlander J. A cross-sectional measurement of medical student empathy. *J Gen Intern Med* 2007;22:1434-8.
31. Hennings A, Hilbert A, Thomas J, Siegfried W, Rief W. Reduction of stigma against obese people: Effects of an educational film. *Psychother Psychosom Med Psychol* 2007;57:359-63.
32. Matharu K. Using Indigenous Australian drama to break cultural barriers in healthcare relationships. *Med Humanit* 2009;35:47-53.
33. Clark RE. Resistance to change: Unconscious knowledge and the challenge of unlearning. *Changing institutions, environments and people*, New York: Routledge; 2009. p. 75-94.
34. Shapiro J, Cho B. Medical readers' theater: Relevance to geriatrics medical education. *Geront Geriatr Educ* 2011;32:350-66.
35. Dow AW, Leong D, Anderson A, Wenzel RP, VCU Theater-Medicine Team. Using theater to teach clinical empathy: A pilot study. *J Gen Int Med* 2007;22:1114-8.
36. Kapitan L. The Empathic Imagination of Art Therapy: Good for the Brain? *Art Ther* 2010;27:158-9.
37. Danielsdottir S, O'Brien KS, Ciao A. Anti-fat prejudice reduction: A review of published studies. *Obes Facts* 2010;3:47-58.
38. McMichael MR. The dynamics of fat acceptance: Rhetoric and resistance to the obesity epidemic. Texas: Texas Tech University; 2010.
39. Heru AM. Using role playing to increase residents' awareness of medical student mistreatment. *Acad Med* 2003;78:35-8.
40. Hammer RR, Rian JD, Gregory JK, Bostwick JM, Barrett Birk C, Chalfant L, *et al.* Telling the patient's story: Using theatre training to improve case presentation skills. *Med Humanit* 2011;37:18-22.
41. Shankar PR. Medical Humanities in Nepal: Questions and Challenges. *Med Humanit* 2008;34:120.

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